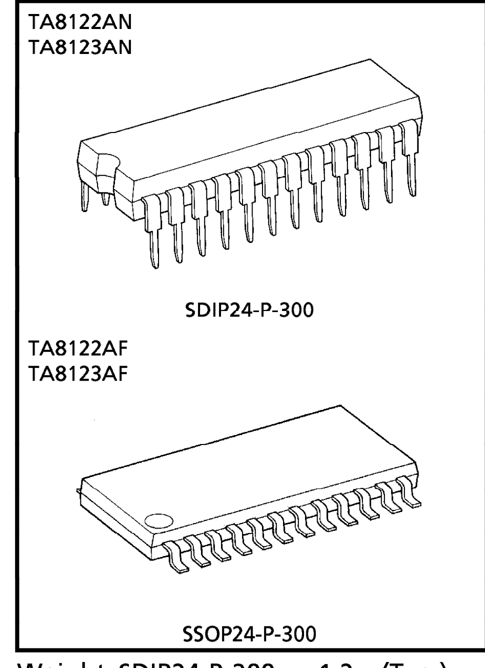
TA8122AN, TA8122AF
TA8123AN, TA8123AF

SILICON MONOLITHIC

3V AV / FM 1CHIP TUNER IC

TA8122AN / AF and TA8123AN / AF are the AM / FM 1Chip Tuner ICs, which are designed for Portable Radios and 3V Headphone Radios.



Weight SDIP24-P-300 : 1.2g (Typ.)
SSOP24-P-300 : 0.31g (Typ.)

FEATURES

- Built-in

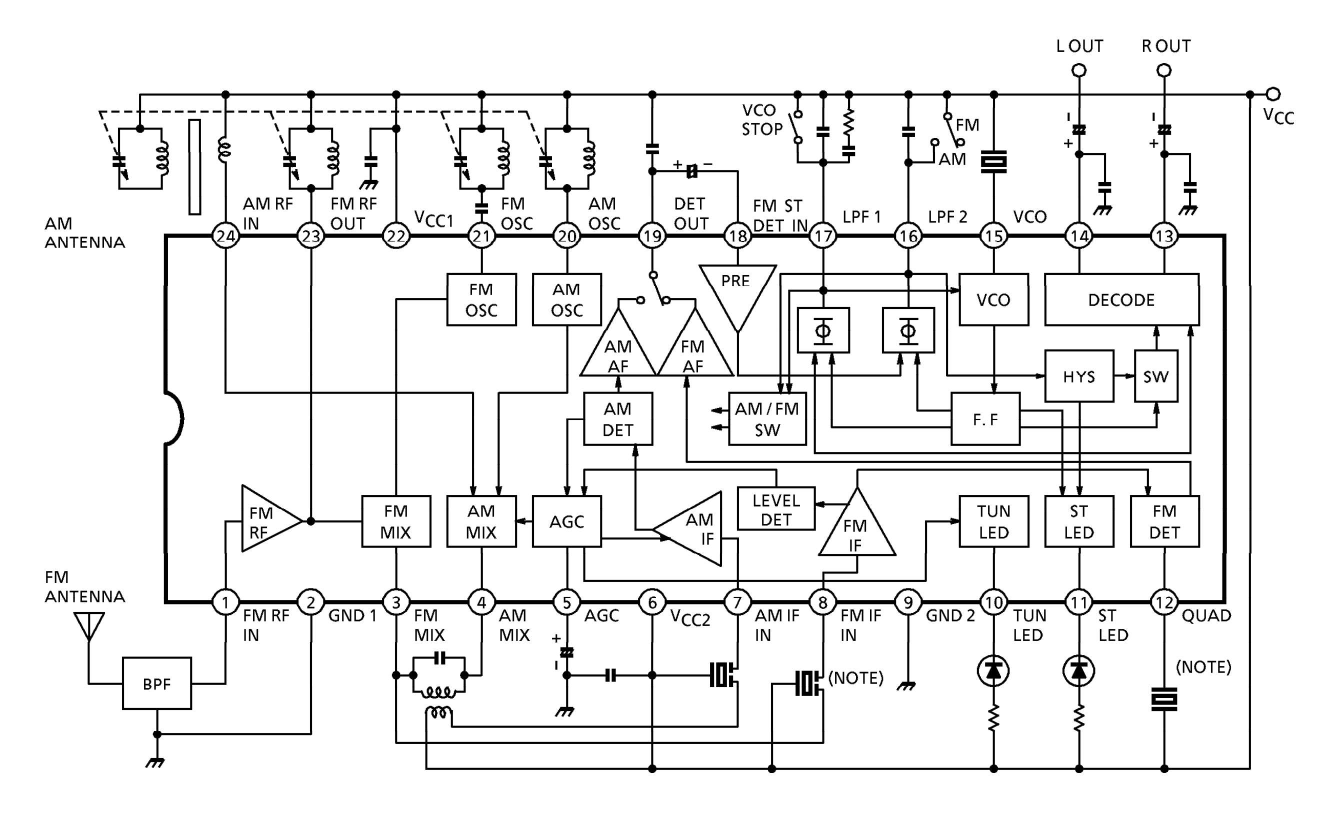
  FM F / E, AM / FM IF and FM ST DET
- AM Detector Coil, FM IFT and IF Coupling Condenser are not needed.
- For adopting Ceramic Discriminator and Ceramic Resonator, it is not necessary to adjust the FM Quad Detector Circuit and FM ST DET VCO Circuit.
- S curve characteristics of FM detection output in TA8122AN / AF and TA8123AN / AF are reverse to each other.

  TA8122AN / AF : Reverse characteristic
  TA8123AN / AF : Normal characteristic
- Compact Package

  TA8122AN / 23AN : Shrink DIP 24 pin (1.78mm pitch)
  TA8122AF / 23AF : Mini Flat Package 24 pin
- Operating Supply Voltage Range

  V_{CC} = 1.8~7.0V (Ta = 25°C)

BLOCK DIAGRAM



(Note)
We recommend the kit of the ceramic filter and the ceramic resonator which are shown in the table as below.
It is necessary to meet the center frequency of the ceramic filter and the ceramic resonator, otherwise there are some cases that the characteristics get worse.

KIT NAME	COMBINATION			
	CERAMIC FILTER	Q'ty	CERAMIC RESONATOR	Q'ty
KMFC403-Z	SFE10.7MA5-Z	2	CDA10.7MG16-Z	1
KMFC411-Z	SFE10.7MA5-Z	1	CDA10.7MG16-Z	1
KMFC422-Z	SFE10.7MA2-Z	2	CDA10.7MG16-Z	1
KMFC435-Z	SFE10.7MA5L-Z	2	CDA10.7MG16-Z	1
KMFC445-Z	SFE10.7MA5L-Z	1	CDA10.7MG16-Z	1

MANUFACTURER : MURATA MFG. CO., LTD

EXPLANATION OF TERMINALS

PIN No.	CHARACTERISTIC	INTERNAL CIRCUIT	DC VOLTAGE (V) (AT NO SIGNAL)	
			AM	FM
1	FM-RF IN	FM-RF OUT, 23, 1, GND1 2, 1kΩ, 50pF	0	0.7
2	GND1 (GND For RF Stage)	—	0	0
3	FM MIX	V_{CC1} 22, 3, 2.7kΩ, MIX, 270Ω, GND1 2	2.3	1.8
4	AM MIX	V_{CC1} 22, 4, MIX, GND1 2	2.3	1.8
5	AGC (AM AGC)	IF AGC, 5, AGC, RF AGC, GND2 9	0	0
6	V_{CC2} (V_{CC} For IF / MPX Stage)	—	3.0	3.0

PIN No.	CHARACTERISTIC	INTERNAL CIRCUIT	DC VOLTAGE (V) (AT NO SIGNAL)	
			AM	FM
7	AM IF IN	VCC2 6, 3kΩ, 7, GND2 9	3.0	3.0
8	FM IF IN	VCC2 6, 330Ω, 8, GND2 9	3.0	3.0
9	GND2 (GND For IF / MPX Stage)	—	0	0
10	TUN LED (Tuning LED)	VCC2 6, 10, GND2 9	—	—
11	ST LED (Stereo LED)	19kHz, 11, GND2 9	—	—
12	QUAD (FM QUAD. Detector)	12, VCC2 6, GND2 9	2.4	2.1

PIN No.	CHARACTERISTIC	INTERNAL CIRCUIT	DC VOLTAGE (V) (AT NO SIGNAL)	
			AM	FM
13 14	R-OUT (R-ch Output) L-OUT (L-ch Output)	V_{CC2} 6, 13/14, 5kΩ, GND2 9	1.0	1.0
15	VCO	V_{CC2} 6, 15, GND2 9	2.5	2.5 (VCO stop mode)
16	LPF2 ● LPF Terminal For Synchronous Detector ● Bias Terminal For AM / FM SW Circuit $V_{16} = V_{CC}$ →AM V_{16} = Open→FM	16, AM / FM SW, GND2 9	3.0	2.2 (VCO stop mode 2.7)
17	LPF1 LPF Terminal For Phase Detector VCO Stop Terminal $V_{17} = V_{CC}$→VCO Stop	17, DC AMP, GND2 9	2.7	2.2
18	FM ST DET IN	18, GND2 9	0.7	0.7

PIN No.	CHARACTERISTIC	INTERNAL CIRCUIT	DC VOLTAGE (V) (AT NO SIGNAL)	
			AM	FM
19	DET OUT	V_{CC2} (6), AM, FM, (19), ⓐ, ⓑ, GND2 (9) ⓐ LOW→FM, HIGH→AM ⓑ LOW→AM, HIGH→FM	1.5	1.2
20	AM OSC	V_{CC1} (22), (20), MIX, GND1 (2)	3.0	3.0
21	FM OSC	V_{CC1} (22), (21), MIX, GND1 (2)	3.0	3.0
22	V_{CC1} (V_{CC} For RF Stage)	—	3.0	3.0
23	FM RF OUT	cf. pin①	3.0	3.0
24	AM RF IN	V_{CC1} (22), (24), GND2 (2)	3.0	3.0

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Supply Voltage		V_{CC}	8	V
LED Current		I_{LED}	10	mA
LED Voltage		V_{LED}	8	V
Power Dissipation	TA8122AN / 23AN	P_D (Note)	1200	mW
	TA8122AF / 23AF		400	
Operating Temperature		T_{opr}	−25~75	°C
Storage Temperature		T_{stg}	−55~150	°C

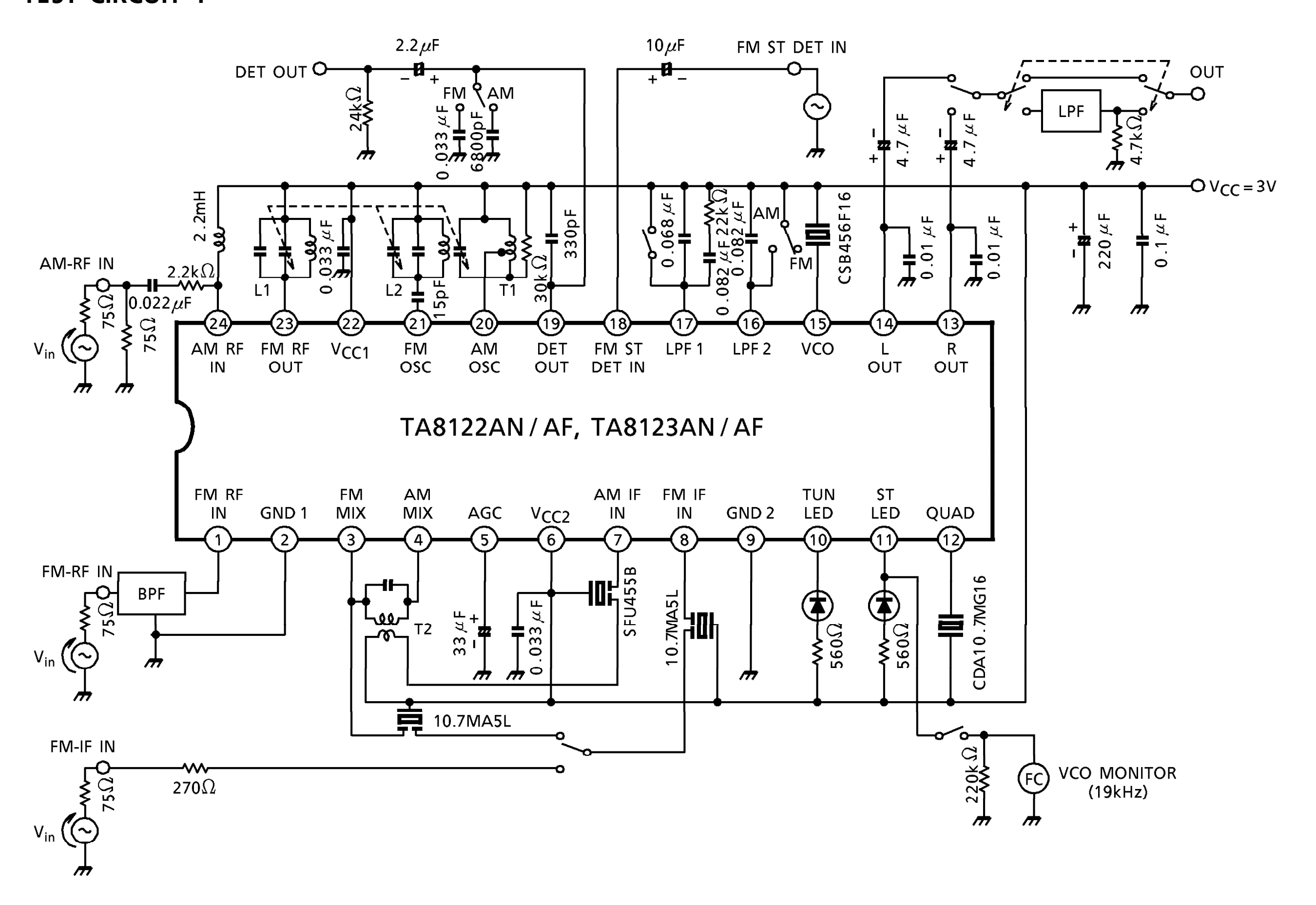
Note : Derated above 25°C in the proportion of 9.6mW / °C for TA8122AN / 23AN and of 3.2mW / °C for TA8122AF / 23AF

ELECTRICAL CHARACTERISTICS
Unless otherwise specified,
Ta = 25°C, V_{CC} = 3V, F / E : f = 83MHz, f_m = 1kHz
FM IF : f = 10.7MHz, Δf = ±22.5kHz, f_m = 1kHz
AM : f = 1MHz, MOD = 30%, f_m = 1kHz
FM ST DET : f_m = 1kHz

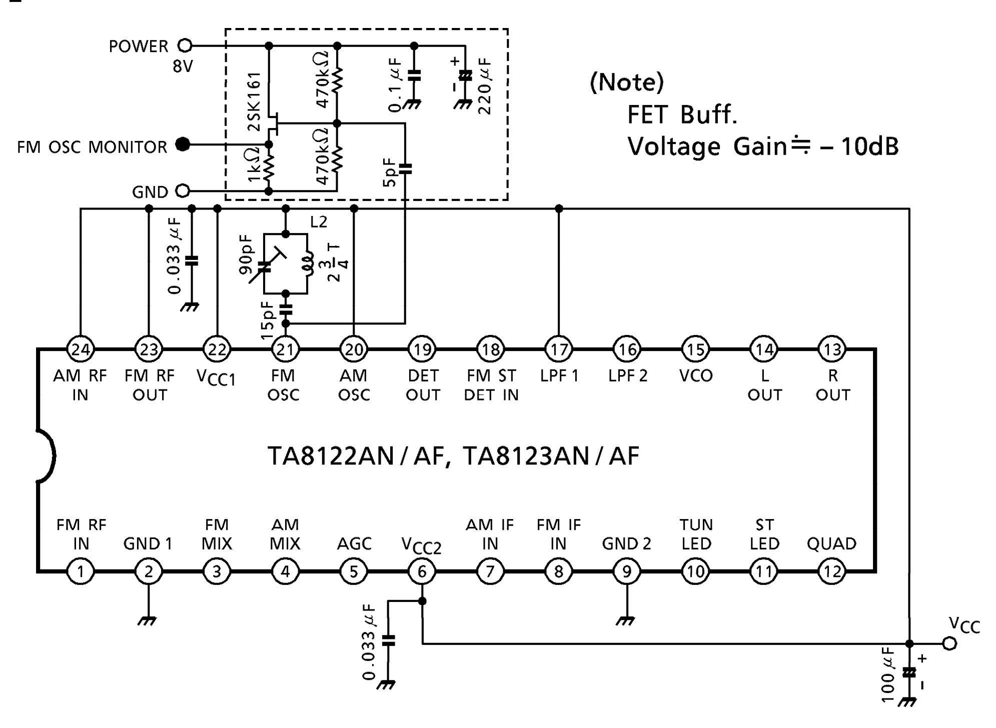
CHARACTERISTIC		SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current		I_{CC} (FM)	1	V_{in} = 0, FM mode	—	14.0	18.5	mA
		I_{CC} (AM)	1	V_{in} = 0, AM mode	—	6.0	8.3	
F / E	Input Limiting Voltage	V_{in} (lim.)	1	−3dB limiting	—	14.0	—	dBμV EMF
	Local OSC Voltage	V_{OSC}	2	f_{OSC} = 72.3MHz	70	105	140	mV_{rms}
FM IN	Input Limiting Voltage	V_{in} (lim.) IF	1	−3dB limiting	39	44	49	dBμV EMF
	Recovered Output Voltage	V_{OD}	1	V_{in} = 80dBμV EMF	55	80	110	mV_{rms}
	Signal To Noise Ratio	S / N	1	V_{in} = 80dBμV EMF	—	70	—	dB
	Total Harmonic Distortion	THD	1	V_{in} = 80dBμV EMF	—	0.4	—	%
	AM Rejection Ratio	AMR	1	V_{in} = 80dBμV EMF	—	50	—	dB
	LED ON Sensitivity	V_L	1	I_L = 1mA	43	48	53	dBμV EMF
AM	Gain	G_V	1	V_{in} = 23dBμV EMF	20	40	80	mV_{rms}
	Recovered Output Voltage	V_{OD}	1	V_{in} = 60dBμV EMF	50	60	100	mV_{rms}
	Signal To Noise Ratio	S / N	1	V_{in} = 60dBμV EMF	—	44	—	dB
	Total Harmonic Distortion	THD	1	V_{in} = 60dBμV EMF	—	1.0	—	%
	LED ON Sensitivity	V_L	1	I_L = 1mA	19	24	29	dBμV EMF
Pin⑲ Output Resistance		R_{19}	1	FM mode	—	0.75	—	kΩ
				AM mode	—	12.5	—	

	CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION		MIN.	TYP.	MAX.	UNIT
FM ST DET	Input Resistance		R_{IN}	—	—		—	24	—	kΩ
	Output Resistance		R_{OUT}	—	—		—	5	—	kΩ
	Max. Composite Signal Input Voltage		$V_{in\ (MAX.)}$ STEREO	1	L + R = 90%, P = 10%, f_m = 1kHz, THD = 3%		—	350	—	mV_{rms}
	Separation		Sep.	1	L + R = 135mV_{rms}, P = 15mV_{rms}	f_m = 100Hz	—	42	—	dB
						f_m = 1kHz	35	42	—	
						f_m = 10kHz	—	42		
	Total Harmonic Distortion	Monaural	THD (MONAURAL)	1	V_{in} = 150mV_{rms}		—	0.2	—	%
		Stereo	THD (STEREO)		L + R = 135mV_{rms}, P = 15mV_{rms}		—	0.2	—	
	Voltage Gain		$G_{V\ (FM\ ST\ DET)}$	1	V_{in} = 150mV_{rms}		− 5	− 3	− 1	dB
	Channel Balance		C.B.	1	V_{in} = 150mV_{rms}		− 2	0	2	
	Stereo LED Sensitivity	ON	$V_{L\ (ON)}$	1	Pilot Input		—	8	15	mV_{rms}
		OFF	$V_{L\ (OFF)}$				2	6	—	
	Stereo LED Hysteresis		V_H	1	To LED turn off from LED turn on		—	2	—	mV_{rms}
	Capture Range		C.R.	1	P = 15mV_{rms}		—	1.3	—	%
	Signal To Noise Ratio		S / N	1	V_{in} = 150mV_{rms}		—	70	—	dB

TEST CIRCUIT 1



TEST CIRCUIT 2



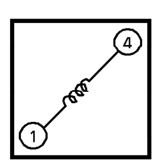
(Note)
FET Buff.
Voltage Gain ≒ −10dB

COIL DATA

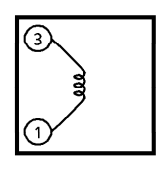
COIL No.	TEST FREQ.	L (μH)	C_o (pF)	Q_o	TURNS					WIRE (mmφ)	REFERENCE
					1-2	2-3	1-3	1-4	4-6		
L_1 FM RF	100MHz	—	—	100	—	—	—	$2\frac{1}{2}$	—	0.5UEW	Ⓢ 53T-037-202
L_2 FM OSC	100MHz	—	—	100	—	—	$2\frac{3}{4}$	—	—	0.5UEW	Ⓢ 0258-244
T_1 AM OSC	796kHz	288	—	115	13	73	—	—	—	0.08UEW	Ⓢ 4147-1356-038
T_2 AM IFT	455kHz	—	180	120	—	—	180	—	15	0.08UEW	Ⓢ 2150-2162-165

Ⓢ : SUMIDA ELECTRIC CO., LED.

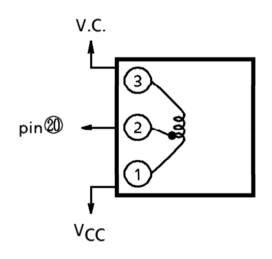




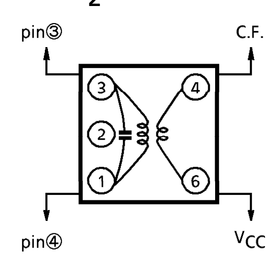
L_2 : FM OSC



T_1 : AM OSC

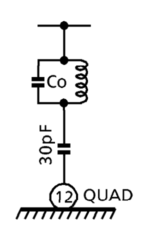


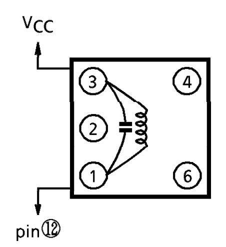
T_2 : AM IFT



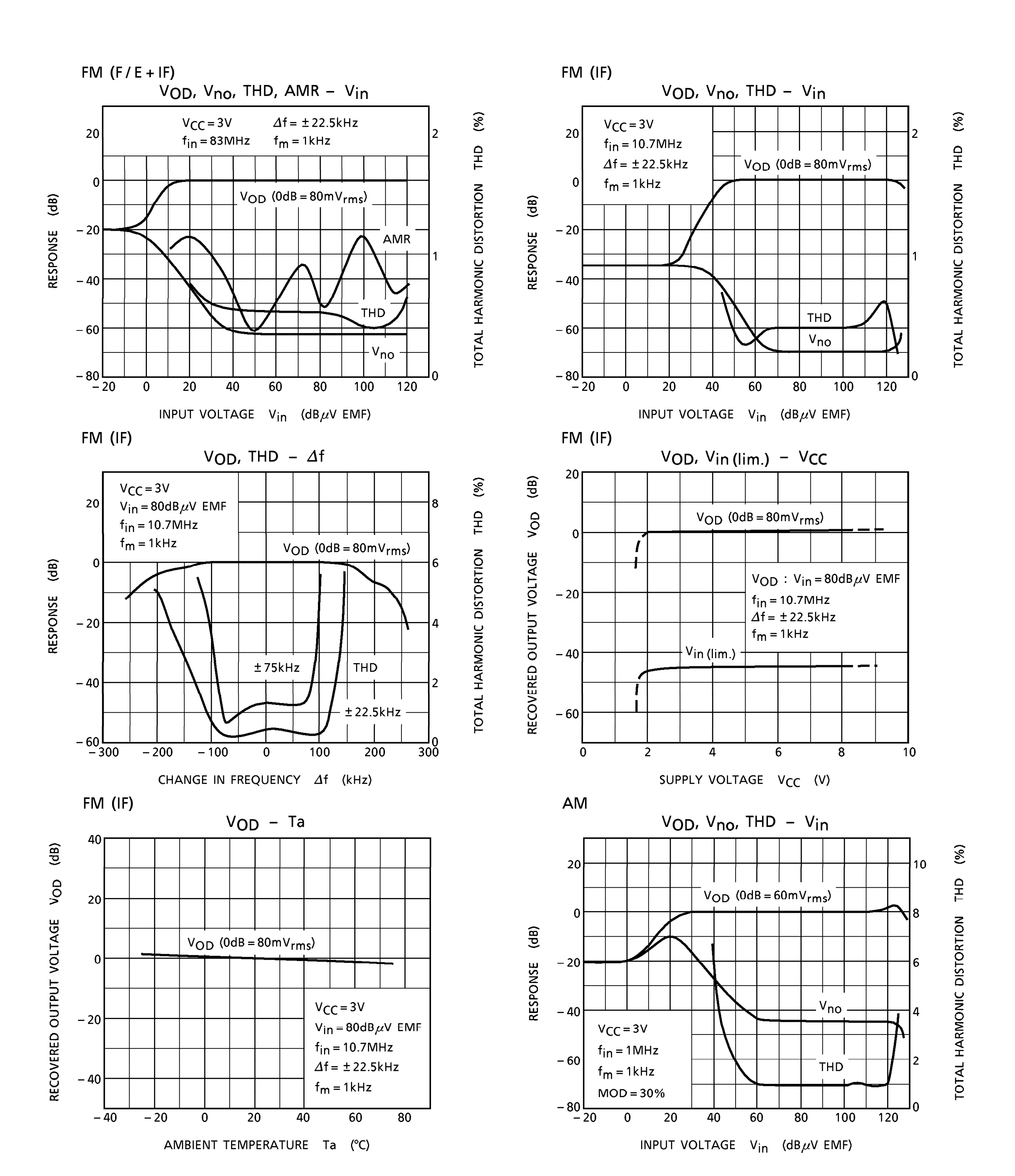
FM DETECTION CIRCUIT

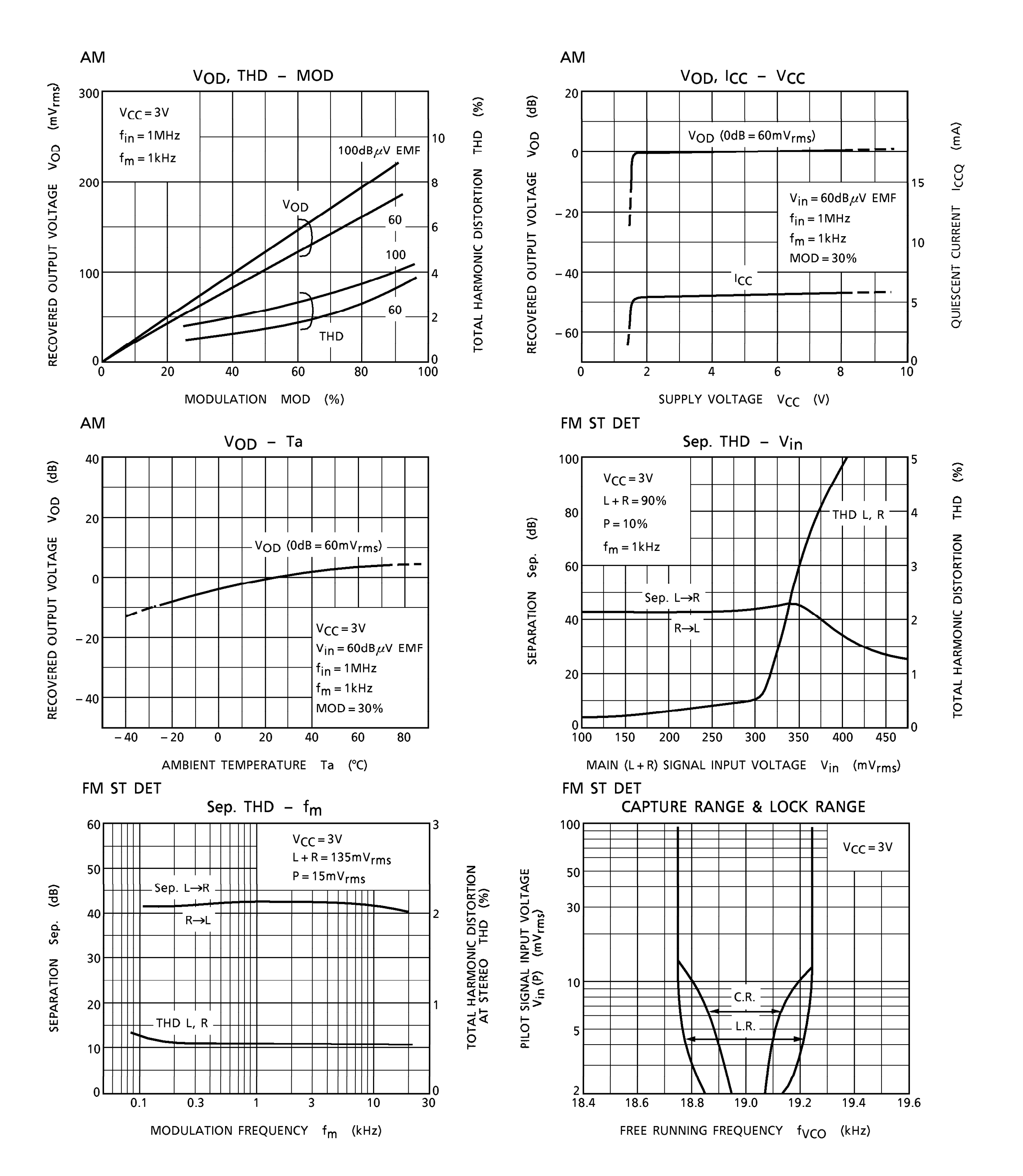
For the FM detection circuit, detection coil is able to use instead of ceramic discriminator.
Recommended circuit and recommended coil are as follows.
In this case, please take care that $V_{in\ (lim.)}$ falls a little.

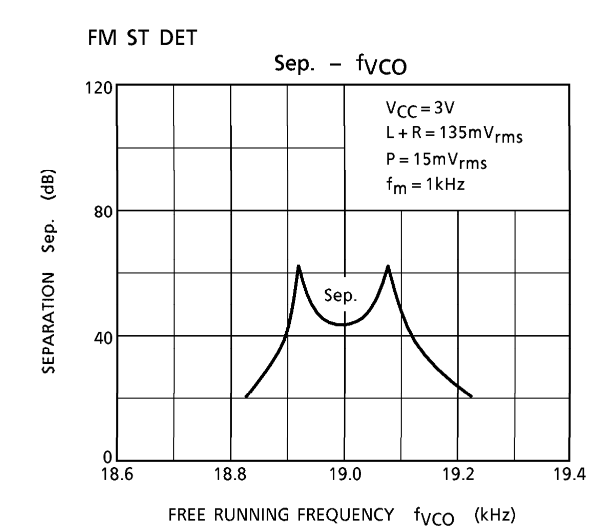


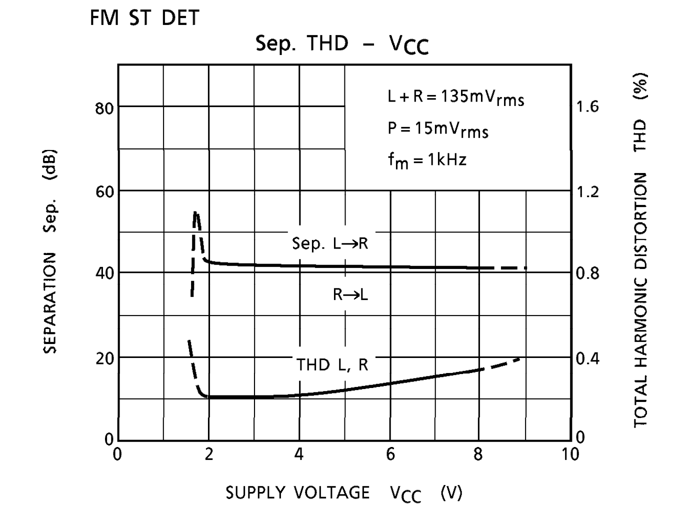


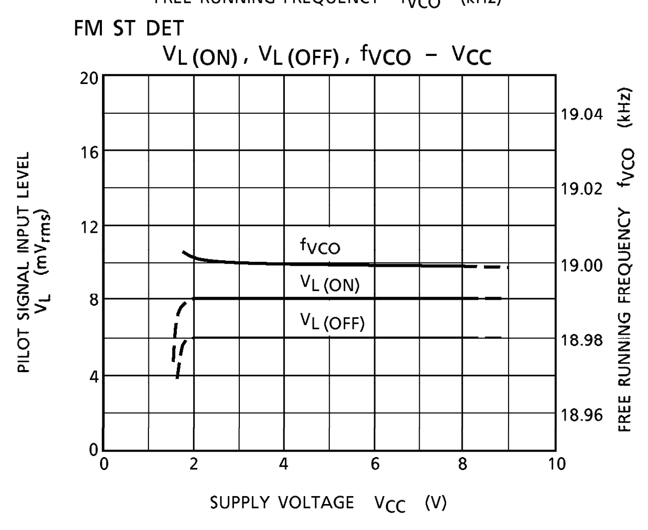
TEST FREQUENCY	C_o (pF)	Q_o	TURNS				WIRE (mmφ)	REF
			1-2	2-3	1-3	4-6		
10.7MHz	100	100	—	—	12	—	0.12UEW	SUMIDA ELECTRIC CO., LTD 2153-4095-189 or Equivalent


FM (F / E + IF)
VOD, Vno, THD, AMR − Vin
VCC = 3V Δf = ±22.5kHz
fin = 83MHz fm = 1kHz
VOD (0dB = 80mVrms)
AMR
THD
Vno
RESPONSE (dB)
TOTAL HARMONIC DISTORTION THD (%)
INPUT VOLTAGE Vin (dBμV EMF)
FM (IF)
VOD, Vno, THD − Vin
VCC = 3V
fin = 10.7MHz
Δf = ±22.5kHz
fm = 1kHz
VOD (0dB = 80mVrms)
THD
Vno
RESPONSE (dB)
TOTAL HARMONIC DISTORTION THD (%)
INPUT VOLTAGE Vin (dBμV EMF)
FM (IF)
VOD, THD − Δf
VCC = 3V
Vin = 80dBμV EMF
fin = 10.7MHz
fm = 1kHz
VOD (0dB = 80mVrms)
±75kHz
THD
±22.5kHz
RESPONSE (dB)
TOTAL HARMONIC DISTORTION THD (%)
CHANGE IN FREQUENCY Δf (kHz)
FM (IF)
VOD, Vin (lim.) − VCC
VOD (0dB = 80mVrms)
VOD : Vin = 80dBμV EMF
fin = 10.7MHz
Δf = ±22.5kHz
fm = 1kHz
Vin (lim.)
RECOVERED OUTPUT VOLTAGE VOD (dB)
SUPPLY VOLTAGE VCC (V)
FM (IF)
VOD − Ta
VOD (0dB = 80mVrms)
VCC = 3V
Vin = 80dBμV EMF
fin = 10.7MHz
Δf = ±22.5kHz
fm = 1kHz
RECOVERED OUTPUT VOLTAGE VOD (dB)
AMBIENT TEMPERATURE Ta (°C)
AM
VOD, Vno, THD − Vin
VOD (0dB = 60mVrms)
Vno
THD
VCC = 3V
fin = 1MHz
fm = 1kHz
MOD = 30%
RESPONSE (dB)
TOTAL HARMONIC DISTORTION THD (%)
INPUT VOLTAGE Vin (dBμV EMF)


AM
VOD, THD – MOD
VCC = 3V
fin = 1MHz
fm = 1kHz
100dBμV EMF
VOD
60
100
60
THD
RECOVERED OUTPUT VOLTAGE VOD (mVrms)
TOTAL HARMONIC DISTORTION THD (%)
MODULATION MOD (%)
AM
VOD, ICC – VCC
VOD (0dB = 60mVrms)
Vin = 60dBμV EMF
fin = 1MHz
fm = 1kHz
MOD = 30%
ICC
RECOVERED OUTPUT VOLTAGE VOD (dB)
QUIESCENT CURRENT ICCQ (mA)
SUPPLY VOLTAGE VCC (V)
AM
VOD – Ta
VOD (0dB = 60mVrms)
VCC = 3V
Vin = 60dBμV EMF
fin = 1MHz
fm = 1kHz
MOD = 30%
RECOVERED OUTPUT VOLTAGE VOD (dB)
AMBIENT TEMPERATURE Ta (°C)
FM ST DET
Sep. THD – Vin
VCC = 3V
L + R = 90%
P = 10%
fm = 1kHz
THD L, R
Sep. L→R
R→L
SEPARATION Sep. (dB)
TOTAL HARMONIC DISTORTION THD (%)
MAIN (L + R) SIGNAL INPUT VOLTAGE Vin (mVrms)
FM ST DET
Sep. THD – fm
VCC = 3V
L + R = 135mVrms
P = 15mVrms
Sep. L→R
R→L
THD L, R
SEPARATION Sep. (dB)
TOTAL HARMONIC DISTORTION AT STEREO THD (%)
MODULATION FREQUENCY fm (kHz)
FM ST DET
CAPTURE RANGE & LOCK RANGE
VCC = 3V
C.R.
L.R.
PILOT SIGNAL INPUT VOLTAGE Vin (P) (mVrms)
FREE RUNNING FREQUENCY fVCO (kHz)


FM ST DET
Sep. – fVCO
VCC = 3V
L + R = 135mVrms
P = 15mVrms
fm = 1kHz
Sep.
SEPARATION Sep. (dB)
120
80
40
0
18.6
18.8
19.0
19.2
19.4
FREE RUNNING FREQUENCY fVCO (kHz)

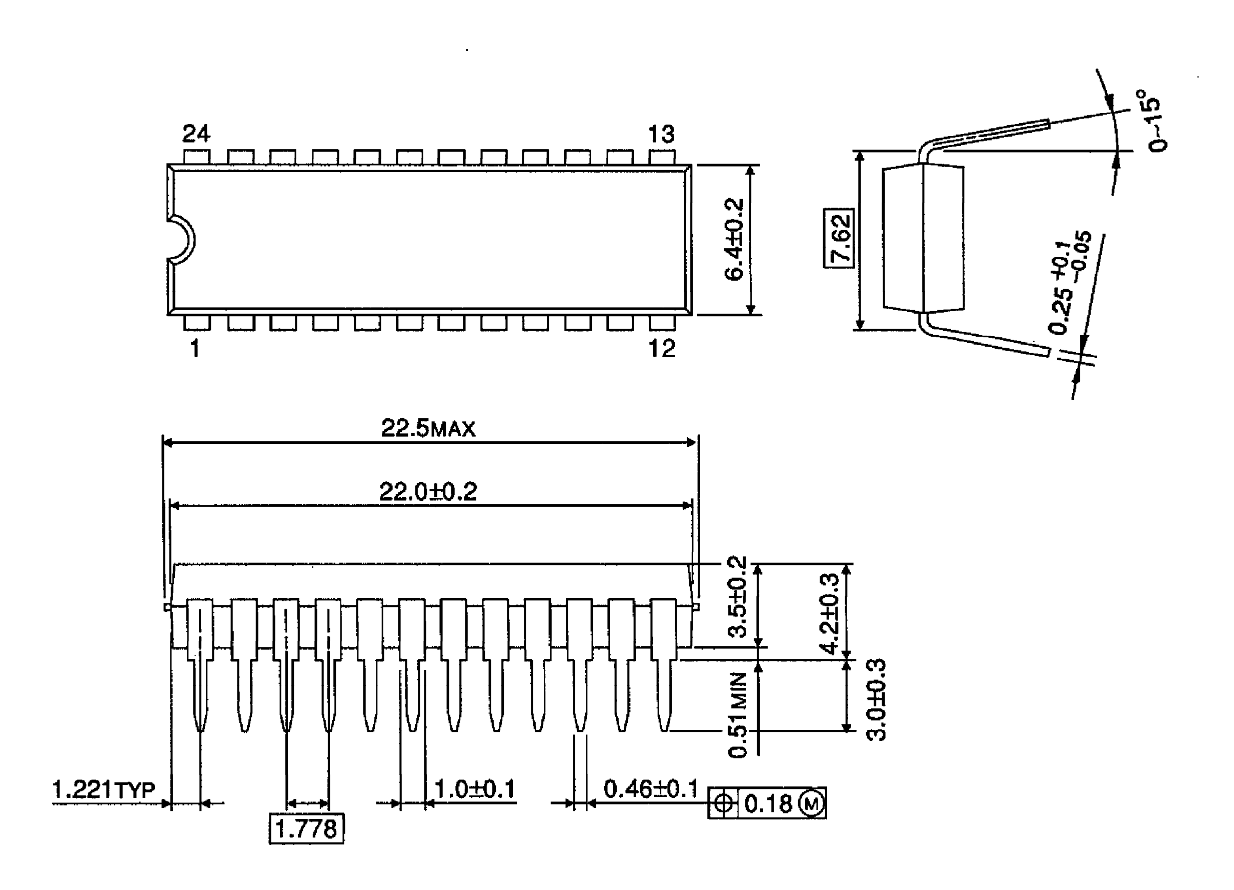

FM ST DET
Sep. THD – VCC
L + R = 135mVrms
P = 15mVrms
fm = 1kHz
Sep. L→R
R→L
THD L, R
SEPARATION Sep. (dB)
TOTAL HARMONIC DISTORTION THD (%)
80
60
40
20
0
1.6
1.2
0.8
0.4
0
2
4
6
8
10
SUPPLY VOLTAGE VCC (V)


FM ST DET
VL (ON), VL (OFF), fVCO – VCC
fVCO
VL (ON)
VL (OFF)
PILOT SIGNAL INPUT LEVEL VL (mVrms)
FREE RUNNING FREQUENCY fVCO (kHz)
20
16
12
8
4
0
19.04
19.02
19.00
18.98
18.96
2
4
6
8
10
SUPPLY VOLTAGE VCC (V)



OUTLINE DRAWING
SDIP24-P-300

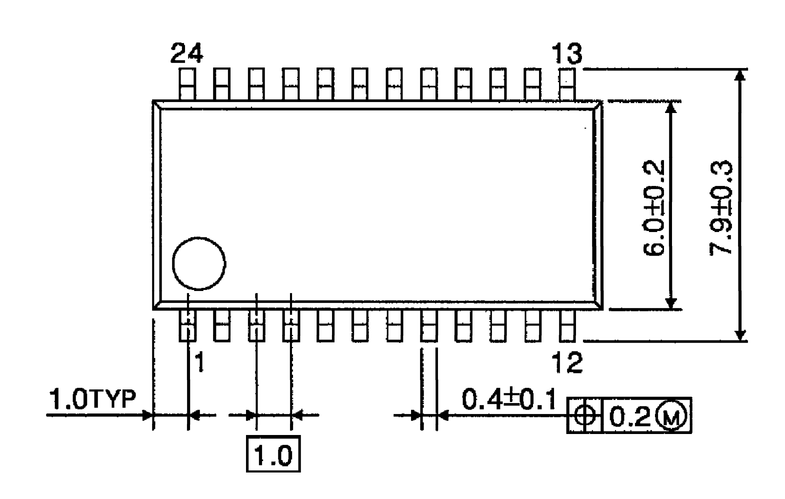
Unit : mm

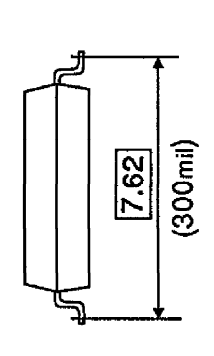


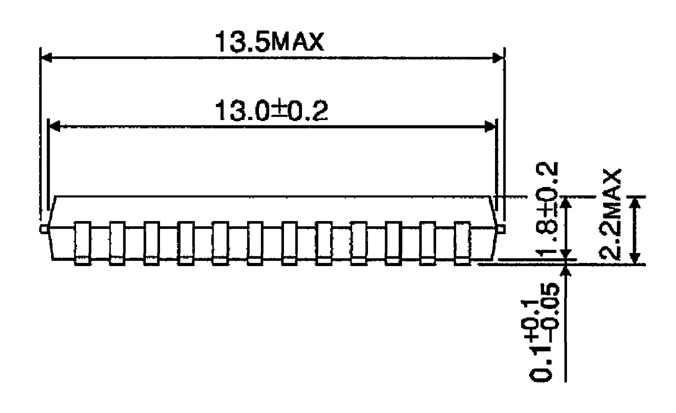
Weight : 1.2g (Typ.)

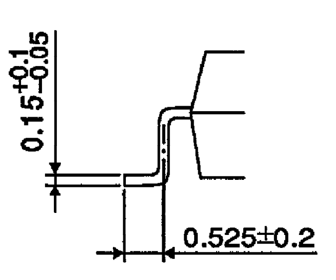
OUTLINE DRAWING
SSOP24-P-300

Unit : mm









Weight : 0.31g (Typ.)